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MALARIA CONTROL.

RESULTS OBTAINED BY A LOCAL COMMUNITY FOLLOWING ANTIMOSQUITO DEMONSTRATION STUDIES BY THE UNITED STATES PUBLIC HEALTH SERVICE IN COOPERATION WITH THE INTERNATIONAL HEALTH BOARD.

(Direction: J. E. SPARKS, M. D., Chief Surgeon, Crossett Lumber Co. Advisory Supervision: R. C. DERIVAUX, Passed Assistant Surgeon, United States Public Health Service; H. A. TAYLOR, M. D.; Field Director, International Health Board.)

Demonstrations of malaria control through antimosquito measures have been repeatedly made by the United States Public Health Service, and the concrete results, measured by reduction in prevalence of the disease, have been published.¹ On the other hand, it has previously been impossible to report, except in general terms, the results in so far as they related to the continuance of the antimalaria work by the local health authorities. Such results are the real measure of the success of these demonstration studies.

In 1916 a demonstration of antimosquito measures was conducted at Crossett,² Ark., by the Public Health Service in cooperation with the International Health Board and with the approval of the State Board of Health of Arkansas.³ In 1917, in conformity with recommendations made by the Public Health Service to the city of Crossett and the Crossett Lumber Co., necessary appropriations were made, and the mosquito control activities were included in the existing civic routine for continuance under the supervision of the local hospital and health department. The Public Health Service and International Health Board discontinued active operations, but their representatives gave supervisory assistance. As accurate records were kept, it is now possible to compare the cost and effects of demonstration work of the service in malaria control with those resulting from the continuation of such work by a local community.

Results of 1916 activities.—The results obtained during the first year may be summarized as follows:

As ascertained by repeated parasite indices, a reduction of 77.33 per cent was obtained and a reduction of the total visits for malaria, as compared with the previous year (1915), of 70.39 per cent; for the "active" season, comprising the months from and including June to December, a reduction of visits of 82.07 per cent was obtained from the number made in the same period of the year before.

The total costs of the control operations aggregate \$2,506.40, a per capita cost of \$1.23½. Control work is to be continued and, much of the first work being of a permanent character, should cost substantially less.⁴

¹ Demonstrations of Malaria Control. By R. H. von Ezdorf. Reprint No. 328 from the Public Health Reports (Mar. 10, 1916). Public Health Bulletin No. 88—Malaria Control. A report of demonstration studies conducted in urban and rural sections. By R. C. Derivaux, H. A. Taylor, and T. D. Haas. The annual reports of the Surgeon General, United States Public Health Service, for the years 1915, 1916, and 1917, contain further reports of demonstration studies in malaria control.

² A lumber community of 2,029 inhabitants, situated in Ashley County, southeastern Arkansas.

³ Public Health Bulletin No. 88.

⁴ Public Health Bulletin No. 88, p. 5.

Conditions in Crossett in 1917.—Conditions in and about Crossett have undergone practically no alteration during 1917 other than those of population incidental to the departure of a number of young men, most of them unmarried, for military service and their replacement by newcomers, accompanied in many instances by families. Although the number of inhabitants is said to have been about the same in 1917 as in 1916, these changes in the character of the population may have affected the local incidence of malaria, and, in the absence of continued protective activities, might have contributed to a return toward the high prevalence prior to 1916.

The climatologic conditions during 1917 are shown in the following table, prepared from the summaries on observations of the local Weather Bureau station:

TABLE 1.—*Summary, meteorologic data, Crossett, Ark., 1917.*

Month.	Temperature.			Total precipitation.	Remarks.
	Mean.	Maximum.	Minimum.		
	° F.	° F.	° F.	Inches.	
January.....	49.0	79	19	5.78	
February.....	49.4	85	15	2.83	
March.....	57.1	84	22	4.77	
April.....	63.4	87	36	7.61	
May.....	67.5	92	40	1.98	Last killing frost May 8.
June.....	78.2	97	50	3.47	
July.....	80.3	103	63	4.43	
August.....	82.0	98	58	4.85	
September.....	73.3	95	50	1.58	
October.....	59.9	89	26	2.53	First killing frost Oct. 9.
November.....	52.3	75	21	0.61	
December.....	41.0	74	9	1.85	
Total.....				42.29	

As a whole, considerably less malaria has occurred in southeastern Arkansas and northern Louisiana during 1917 than has formerly been usual, which has undoubtedly been not without importance in modifying the influence of control operations in Crossett. The departure from the "normal" incidence of malaria has been variously estimated by a number of physicians in the adjoining counties and parishes of the States named as having been between 10 and 30 per cent, and has been ascribed to lengthy intervals between successive rains with consequent drying of mosquito-breeding places rather than to any considerable diminution of the total regional precipitation.

Control operations in 1917.—As in the previous year, the measures during 1917 included preliminary clearing and training of streams and ditches, oiling, fills, and control of artificial containers. After instruction by Dr. H. A. Taylor, field director, International Health Board, a sanitary inspector undertook immediate supervision of operations in April. All of the existing streams and ditches were thoroughly cleared of the winter's accumulation of débris by a crew of

colored laborers. For the supplemental routine use of oil, applied by knapsack sprayers, two oilers were employed, half of whose time, however, was applied to maintenance work on ditches, removal of obstructions from streams, and repair of minor damages following rainstorms. Near the end of the season, the streams and ditches were again carefully gone over by a ditching gang, preparatory to cessation of the work for the winter. Due to unusually cool weather, it was found possible to suspend active operations in October, a month earlier than in the preceding year.

Costs.—The costs are given in summary in the following table. In the item "labor" is included the salary of the sanitary inspector and about \$45 for work of a permanent nature.¹

TABLE 2.—*Costs of malaria-control operations, 1917, Crossett, Ark.*

Labor (including salary sanitary inspector, 7 months, at \$60 per month)...	\$1,133.92
Tools, etc.	32.48
Oils ² and other larvicides.	109.05
Total.....	1,275.45

Results.—As one of its primary and most appreciable results, this work was followed by an almost complete freedom from annoyance by mosquitoes during the entire year, comments to this effect being commonly heard. The direct gain in malaria control has been determined by comparison of the 1916 and 1917 records of the Crossett Lumber Co. Hospital of observed cases of malaria and professional visits for the disease. These cases and calls bear a fairly constant relation to the total cases and calls in Crossett.

TABLE 3.—*Reported cases and calls, malaria, Crossett, Ark., 1917.*

	Cases.						Calls.						Total cases.	Total calls.
	White.			Colored.			White.			Colored.				
	M.	F.	T.	M.	F.	T.	M.	F.	T.	M.	F.	T.		
January.....	2		2	2		2	3	1	4	2		2	4	6
February.....		1	1	2		2	2	1	3	3	1	4	3	7
March.....	3	2	5	2	1	3	4	3	7	3	3	6	8	13
April.....	4	1	5	1		1	5	4	9	1	2	3	6	12
May.....	6	3	9	4	1	5	14	8	22	6	3	9	14	31
June.....	2	1	3	1		1	6	3	9	2	4	6	4	15
July.....	3	1	4		1	1	4	1	5	2	2	4	5	9
August.....	5	1	6	2	1	3	10	9	19	8	6	14	9	33
September.....	3	2	5	2	1	3	6	4	10	5	7	12	8	22
October.....	1	2	3	1		1	4	5	9	3	2	5	4	14
November.....		2	2	3		3	3	10	13	6	4	10	5	23
December.....	1	3	4		3	3	4	3	7	2	6	8	7	15
Total.....	30	19	49	20	8	28	65	52	117	43	40	83	77	200

¹ A partial fill of the ditch known as the "Fish Pond Feeder," whereby its area is estimated to have been reduced about half an acre.

² About 3 barrels of oil donated by the city of Crossett are not herein included.

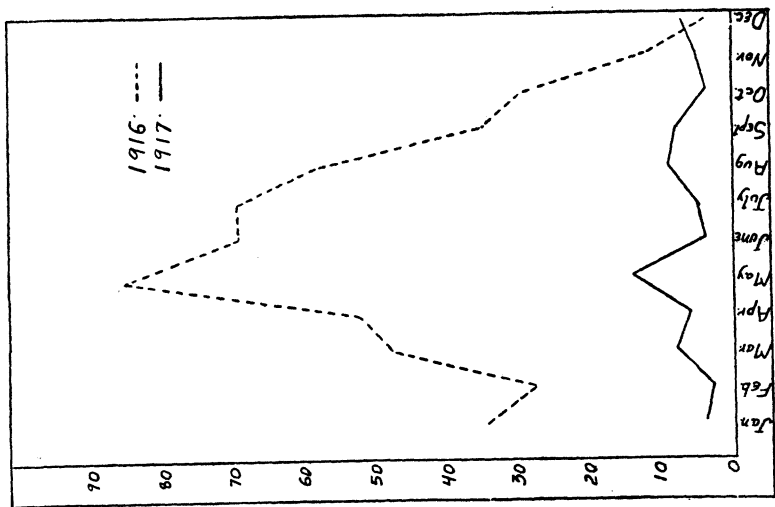


CHART 1.

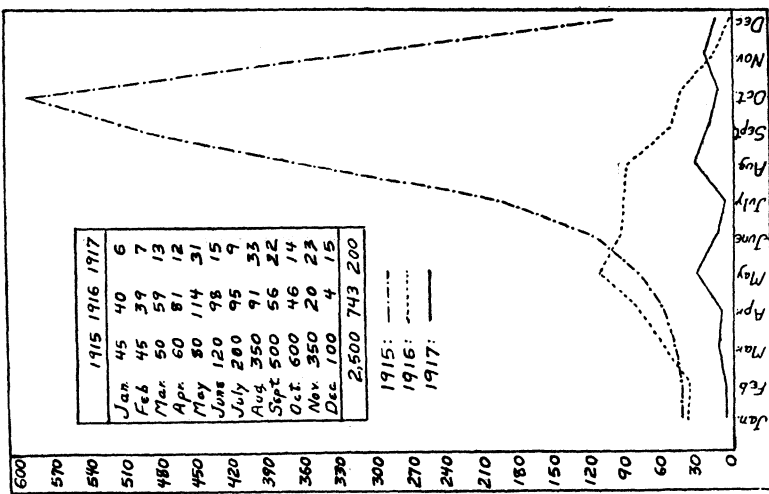


CHART 2.

In chart 1 are presented curves showing the monthly distribution of the cases of malaria in 1916 and 1917. From these may be noted the diminution of the incidence of malaria as manifested by its appearance clinically. The net reduction in 1917 over 1916 was 85.5 per cent and the reduction in May, in which the maximum was reached during both years, was 83.7 per cent. In considering this chart it is to be noted that antimalaria work in 1916 did not begin until May.

Chart 2 shows graphs of the professional visits for malaria during 1915, 1916, and 1917, by months. The total recorded calls for 1915 were distributed by estimate among the different months. This chart is believed to represent most accurately the results progressively obtained through the control campaigns of 1916 and 1917. The reduction in calls in 1916 over the previous year was 70.39 per cent, and in 1917 an additional reduction of 73.07 per cent was made. The gross diminution over the two years was from 2,502 visits to 200 visits, or approximately 92 per cent.

Costs with reference to control gained.—In Table 4 are summarized the costs for the two years' work, for purposes of comparison:

TABLE 4.—*Reduction in malaria at Crossett and its costs.*

	1916	1917
Total cost of control operations.....	\$2,506.40	\$1,275.45
Total population (May, 1916).....	2,029	2,029
Per capita cost.....	\$1.23½	\$0.63
Per family cost (average).....	\$5.51	\$2.71
Reduction in incidence of malaria as ascertained by repeated parasite indices (May to December, 1916)..... per cent.	72.33	
Reduction as determined by comparison of total cases of malaria, 1916 and 1917..... per cent.		85.5
Reduction as determined by comparison of cases occurring in May (maximum), 1916 and 1917..... per cent.		83.7
Reduction as determined by comparison of total professional visits, 1915, 1916, 1917..... per cent.	70.39	73.07
Gross reduction in total calls, 1915-1917..... do.		92.0

Economic effect of the work.—The following letter from the assistant secretary and treasurer of the Crossett Lumber Co. is expressive of the results of the malaria control work at Crossett with special reference to their economic and industrial application:

OCTOBER 16, 1917.

Dr. R. C. DERIVAUX,

United States Marine Hospital, New Orleans, La.

DEAR SIR: During one of your recent visits to Crossett you expressed a desire of receiving some data as to the economic effect of the antimosquito work that you have been conducting for the last two years.

While much might be said in favor of the campaign that has been conducted, there are a few results that deserve special emphasis, purely from the standpoint of labor efficiency.

Living conditions have been much more attractive, purely from the standpoint of comfort resulting in a certain kind of contentment that would not have been possible otherwise.

Comparing conditions with former years. Our pay roll and hospital records show a large number of employees who were idle on account of sickness, principally due to malaria, whereas during the past 12 months there has been practically no shortage of labor from this same cause. Our industry as well as others has suffered on account of scarcity of labor on account of Army volunteering and furnishing quota due to the draft; hence if in addition to these unusual demands upon our men we were further handicapped by the usual amount of sickness as was the rule in former years, our production would have been decreased at this time at least 33 per cent. We have been maintaining a thorough antimosquito campaign during the year for less than \$1,000 and no other investment that we have made will bring us as large returns.

Yours, very truly,

CROSSETT LUMBER Co.;
A. TRIESCHMANN.

Summary.—The control of malaria by measures directed against the anopheline mosquito was continued in Crossett, Ark., by the community during 1917. The measures were the same as those employed by the Public Health Service in its demonstration work conducted in cooperation with the International Health Board. They consisted of drainage and filling operations supplemented by oiling.

The reduction in malaria during 1917 over 1916, as shown by the decrease in number of cases of the disease reported, was 85.5 per cent. The reduction as determined by comparison of the total professional visits for the disease in 1916 and 1917 was 73 per cent. The reduction for both years together, as determined by the professional visits, was 92 per cent. The degree of economic efficiency made possible by this reduction is of particular importance at the present time because of war conditions.

The total cost of the two years' work was \$3,781.85. In 1916 it was \$2,506.40, and in 1917, \$1,275.45, the per capita costs being, respectively, \$1.23½ and \$0.63, and the per family costs \$5.31 and \$2.71—a reduction in the relative cost of the second year over the first of about 50 per cent.

VACCINATION OF SCHOOL CHILDREN.

ARKANSAS SUPREME COURT UPHOLDS A REGULATION REQUIRING VACCINATION OF PUPILS IN THE SCHOOLS OF THE STATE.

In December, 1917, the State Board of Health of Arkansas adopted a regulation requiring a certificate of successful or recent vaccination or a certificate of immunity from smallpox as a condition to attendance upon the schools of the State. The Supreme Court of the State, in an opinion rendered June 3, 1918, decided that the regulation was valid.

The court said:

"It is true that the board of health is not authorized to manage or control the schools of the State, either public or private. That